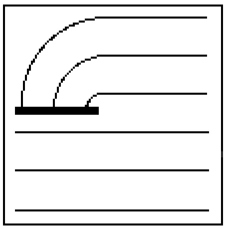
Diffraction

Reflection involves a change in direction of waves when they bounce off a barrier; refraction of waves involves a change in the direction of waves as they pass from one medium to another; and **diffraction** involves a **change in direction of waves as they pass through an opening or around a barrier in their path.** Water waves have the ability to travel around corners, around obstacles and through openings. This ability is most obvious for water waves with longer wavelengths. Diffraction can be demonstrated by placing small barriers and obstacles in a ripple tank and observing the path of the water waves as they encounter the obstacles. The waves are seen to pass around the barrier into the regions behind it; subsequently the water behind the barrier is disturbed. The amount of diffraction (the sharpness of the bending) increases with increasing wavelength and decreases with decreasing wavelength. In fact, when the wavelength of the waves is smaller than the obstacle, no noticeable diffraction occurs.



Diffraction of Waves

Diffraction of sound waves is commonly observed; we notice sound diffracting around corners or through door openings, allowing us to hear others who are speaking to us from adjacent rooms. Many forest-dwelling birds take advantage of the diffractive ability of long-wavelength sound waves. Owls for instance are able to communicate across long distances due to the fact that their long-wavelength *hoots* are able to diffract around forest trees and carry farther than the short-wavelength *tweets* of song birds. Low-pitched (long wavelength) sounds always carry further than high pitched (short wavelength) sounds.